Article

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Non-native shrubby species of *Euphorbia* (*Euphorbiaceae*) in Tunisia

Abstract

El Mokni, R.: Non-native shrubby species of *Euphorbia* (*Euphorbiaceae*) in Tunisia. — Fl. Medit. 33: 17-29. 2023. — ISSN: 1120-4052 printed, 2240-4538 online.

Botanical surveys undertaken in several regions of Tunisia (N Africa), mainly around salty wetlands and flats and along railways since 2015, yielded new records of non-native shrubby plants of the genus *Euphorbia*. These included *Euphorbia canariensis*, *E. cotinifolia* subsp. *cotinoides*, *E. cooperi* var. *cooperi*, *E. cyathophora*, *E. milii*, *E. pulcherrima*, *E. tirucalli* and *E. trigona*. Among these records, three (*E. cotinifolia* subsp. *cotinoides*, *E. cooperi* var. *cooperi*, and *E. cyathophora*) are new for the non-native flora of the Mediterranean area, one for the non-native flora of the continental Africa (*E. canariensis*) whereas *E. trigona* and *E. milii* var. *splendens* are first reports to the non-native flora of N Africa. Moreover, *Euphorbia pulcherrima* is here assigned as first report for the non-native flora of the continental N Africa and *E. tirucalli* is confirmed as an established taxon and its distributive area is here updated. Distributions and brief morphological descriptions are given for each of these new records. Notes on their habitats and their main distinguishable features together with field photographs are also provided.

Key words: floristics, aliens, succulents, new records, N Africa.

Introduction

In parallel to the increase of the industry of ornamental plants, flowering pot plants, flower bulbs and tree and nursery crops throughout the world, the rate of naturalizing plants is going faster and the number of naturalized/established (sometimes invaders) aliens is rising gradually in many countries worldwide. Within the Mediterranean area, in Europe (see e.g. Sanz Elorza & al. 2004; Capdevilla Argüelles & al. 2006; DAISIE 2009; Arianoutsou & al. 2010; Galasso & al. 2018; Domina 2021) as in many countries of N Africa (see e.g. Vilà & al. 1999; Meddour & El Mokni 2016; Sakhraoui & al. 2019; Meddour & al. 2020), the number of alien plant species is growing rapidly. Such alien flora includes a large number of families and genera where only 4 annual species were attributed to genus *Euphorbia* L. subg. *Chamaesyce* (Meddour & al. 2020).

Euphorbia, with around 1840 species distributed worldwide, is one of the most diversified Angiosperm genera of flowering plants (Esser & al. 2009; Horn & al. 2012; Riina & Berry 2012+). *Euphorbia* species occupy a wide range of habitats and exhibit great diversity growth forms including many kinds of prostrate, ascending, erect and small ephemeral

herbaceous annuals or perennial, trees, woody perennials, shrubs and many types of cactus-like succulents (Horn & al. 2012). *Euphorbia* has been subdivided in to 4 subgenera: *Chamaesyce* Raf., *Esula* Pers., *Euphorbia* L. and *Rhizantium* (Boiss) Wheeler (Bruyns & al. 2006). The subgenus *Euphorbia* is known as the subgenus encompassing all succulent species with a pair of thorns axillating the leaves, and it is very diverse in Africa (Bruyns 2006).

In continuation with our previous records of succulents at national scale or even for the whole N Africa (see e.g. El Mokni & al. 2019, 2020, 2022; El Mokni & Verloove 2021a, 2021b, 2022; El Mokni 2022), we present here new casual non-native shrubby succulent species of the genus *Euphorbia* for Tunisia, the Maghreb, N Africa, continental Africa and the Mediterranean area.

Material and Methods

Floristic field investigations carried out in Tunisia, mostly between 2015 and 2022, revealed new national records and even new records for N Africa and the Mediterranean area. Almost all taxa, observed in few (3-7) individuals, were not previously reported from either Tunisia, N Africa or sometimes the Mediterranean area. Records here reported are documented by a brief description of each taxon and infraspecific taxa, whenever present. Further comments on habitats of occurrence and taxonomic notes with closer or infraspecific taxa are also presented. For the identification and description numerous sources were consulted, mainly Eggli (2002), and the Encyclopedia of Succulents (2022) (retrieved from http://www.llifle.com/Encyclopedia/SUCCULENTS/Family/Euphorbiaceae/Euphorbia/). Reported taxa (species, and infraspecific taxa) are arranged alphabetically. Nomenclature is mostly in accordance with classifications of the *Euphorbiaceae* (see e.g. Bruyns & al. 2006; Bruyns 2012; Reveal 2012; Yang & al. 2012; Hassemer & al. 2017; Nobarinezhad & al. 2018; Tropicos 2022).

Results

Among the shrubby, succulent cacti-form and thorny species of *Euphorbia*, eight species are here reported for Tunisia belonging to two subgenera and five sections (subg. *Chamaesyce* with two sect. and subg. *Euphorbia* with three sect.).

Euphorbia canariensis L. Sp. Pl. 1: 450. 1753.
(*Euphorbia* subg. *Euphorbia* L. sect. *Euphorbia* L.)
First report for the non-native flora of the continental Africa.
Morphology (Fig. 1. F-G). *Euphorbia canariensis* is a small succulent shrub, 1 to 3(–4) m high. It clumps profusely from the base, one **trunk** may produce more than 150 branches; **stems** fleshy, stout, highly succulent, columnar, upright growing, deep green to reddish, 4 (rarely 5 or 6) angled up to 8 cm in diameter slightly spiraled; **edges** are obtuse and of a brown colour; **spines** dark shining in pair, perfectly regular, straight to cow-

horn shaped; **cyathium** dark red to reddish-green, surrounded by an involucrum consisting of 1 leaf with 5 division, which have externally 5 glands alternating with them; **male flowers** naked monandrous, articulated with their pedicel surrounding the female, which is in the centre; **female flowers** naked solitary; **ovarium** stalked; **stigma** three forked; **capsules** maroon red on adult plants.

Distribution. *Euphorbia canariensis* is endemic to Canary Islands (POWO 2021). In Europe as in continental Africa, no report till now (Euro+Med 2006+; APD 2022).

Habitat in Tunisia. *Euphorbia canariensis* occurs on the edge of an area where many *Opuntia* sp. pl. are growing up, within Tunis region (NE Tunisia).

Specimen visa (new records). TUNISIA: Tunis, 20.07.2020, *R. El Mokni s.n.* (Herb. Univ. Monastir!).

Euphorbia cotinifolia L. subsp. ***cotinoides*** (Miq.) Christenh., Harvard Pap. Bot. 7: 3. 2002.

≡ *E. cotinoides* Miq., Linnaea 21: 473. (1848); ≡ *Alectoroctonum cotinoides* (Miq.) Klotzsch & Garcke, Monatsber. Königl. Preuss. Akad. Wiss. Berlin 1859: 248. (1859).

(*Euphorbia* subg. *Chamaesyce* Raf. sect. *Alectoroctonum* (Schltdl.) Baill.)

First report for the non-native flora of the Mediterranean area as casual.

Morphology (Fig. 1. A-B). An evergreen tree plant; **trunk** up to 17 cm thick; **branches** spreading, dark red; **leaves** 3-whorled; petiole 2–9 cm, less reddish; leaf blade ovate-rounded, 2–6 × 2–4 cm, both surfaces red, base subtruncate, margin entire, apex obtuse; main vein prominent at both surfaces, lateral veins numerous pairs, reticulate before reaching margin; **cyathia** numerous, peduncle ca. 2 cm; involucre broadly campanulate, ca. 4 × 2.5–3 mm, lobes 4–6, triangular, pilose on margin; glands 4–6, dark green, rounded, appendages white, lobed; **male flowers** numerous, bracts linear; **female flowers** exserted from involucre; ovary 3-angular, with vertical furrows, conspicuous; **capsule** 3-angular-ovoid, ca. 5 × 6 mm, smooth, glabrous; **seeds** subglobose, ca. 3 mm in diam., brown, adaxially dark striate; caruncle absent. Flowering and fruiting period, from April to November (see more in Ma & Gilbert 2008).

Distribution. This subspecies has a native range from Mexico to Bolivia and Trinidad. It was introduced as ornamental to Bangladesh, Benin, Cayman Is., China Southeast, Comoros, Dominican Republic, Hainan, India, Leeward Island, Puerto Rico, Taiwan, Windward Island and with no report in the Mediterranean area (POWO 2022a; APD 2022). It was also cultivated and escaped in Fujian, Hainan, Taiwan and widely cultivated in greenhouses of C and N China and throughout the tropics (see more in Ma & Gilbert 2008).

Habitat in Tunisia. *Euphorbia cotinifolia* subsp. *cotinoides* was found along roadside not far from planted ornamentals in the region of Tabarka, Jendouba (NW Tunisia).

Notes. *Euphorbia cotinifolia* subsp. *cotinoides* differs from the typical subspecies most obviously by its ovate-rounded leaf blade; subtruncate at the base and obtuse in the apex (*vs*. orbiculate, apically rounded leaf blades in the subsp. *cotinifolia*) (see more in Ma & Gilbert 2008).

Specimen visa (new records). TUNISIA: Jendouba, Tabarka, 15.10.2021, *ibidem*, 13.10.2022, *R. El Mokni s.n.* (Herb. Univ. Monastir!).

Euphorbia cooperi N.E. Br. ex A. Berger, Sukk. Euph. 83. 1907 var. ***cooperi***
(*Euphorbia* subg. *Euphorbia* L. sect. *Euphorbia* L.)
First report for the non-native flora of the Mediterranean area as casual.
Morphology (Fig. 2. A-C). A spiny, succulent tree that can reach 6-7 m in height; **trunk** is dark gray or brown and bears the scars of the old branches; branches thick, light green showing five to six ribs lined with pairs of black spines; **leaves** very small, rapidly caducous; **inflorescence** yellowish-green on the terminal segments; **flowers** yellowish green, small (4 mm) bisexual, sessile, arranged in 3 parallel rows along the ridges between the spines towards the tips of the branches, clustered in cymes each with by 3 cyathia with the male flowers at the tip in the centre of the row, and the bisexual flowers below on the outside; **capsule** large, 3-lobed berry-like capsule, 15 × 8 mm long and green in colour with red markings that changes from red to purple when ripe throwing seeds away (Hyde & al. 2021).
Distribution. *Euphorbia cooperi* var. *cooperi*, native from Zimbabwe to South Africa (POWO 2022c). In Europe as in North Africa, no report till now (Euro+Med 2006+; APD 2022).
Habitat in Tunisia. *Euphorbia cooperi* var. *cooperi* on the edges of the metro railway in the region of Monastir (CE Tunisia).
Notes. Three varieties have been recognised for *Euphorbia cooperi* (var. *cooperi*, var. *calidicola* L.C. Leach and var. *ussanguensis* (N.E. Br.) L.C. Leach). The taxon reported here is belonging to *E. cooperi* var. *cooperi*. This latter differs mainly by having branch segments conical-ovate with 3-6 solid winged ridges, much longer than wide (*vs*. much thinner wings on the segments, which are normally wider than long in var. *calidicola* however branch segments are almost circular, (3)4–6(8)-angled; angles stoutly winged in var. *ussanguensis*) (cfr. Hyde & al. 2021).
Specimen visa (new records). TUNISIA: Monastir, Touza, 16.12.2019, *ibidem*, 24 & 26.07.2021, *R. El Mokni s.n.* (Herb. Univ. Monastir!).

Euphorbia cyathophora Murray. Comment. Soc. Regiae Sci. Gott. 7: 81. 1786.
≡ *Poinsettia cyathophora* (Murray) Klotzsch & Garcke in Monatsber. Königl. Preuss. Akad. Wiss. Berlin 1859: 253.1859; ≡ *Euphorbia heterophylla* var. *cyathophora* (Murray) Griseb., Fl. Brit. W. I.: 45. 1859.
(*Euphorbia* subg. *Chamaesyce* Raf. sect. *Poinsettia* (Graham) Baill.)
First report for the non-native flora the Mediterranean area as casual.
Morphology (Fig. 1. C-D). An herbaceous to shrubby annual plant, erect to ascending, grows up to 1.50 m high, glabrous or loosely hairy, with multicellular hairs; **stem** is hollow, cylindrical with ribbed older, hollow, glabrous or sparsely pubescent, more or less yellow, containing a white latex. It bears leaves along its entire length or only at the apex in older plants; **leaves** are simple, stalked, the lower leaves alternate, while the upper leaves are opposite. The blade shape is variable. The terminal leaves are fully red or white colored; **flowers** are small and greenish-yellow, they are contained in small cups bearing on the edge, a small gland flattened bilobed; **capsule** is globose to three quarters out of the cup. (see more in Le Bourgeois & al. 2008).
Distribution. With a native range from C USA to N Central Argentina, the plant was introduced in many countries all over the world but no report from N Africa and the Mediterranean area (POWO 2022b).

Habitat in Tunisia. *Euphorbia cyathophora* was found as an alien (seven individuals in an area of 4 m^2) growing with native herbaceous plants in an oasis within the region of Douz, Kebili (SW Tunisia).

Notes. *Euphorbia cyathophora* is almost similar to *E. heterophylla* L. from which it can be easily recognized by the color of the base of the bracts (often red to pinkish at base in *E. cyathophora vs.* completely green with the very base whitish in *E. heterophylla*), the cyathial glands (with flattened in *E. cyathophora vs.* round opening in *E. heterophylla*), and the seeds (apex truncate in *E. cyathophora vs.* acute in *E. heterophylla*) (see e.g. Silva & al. 2014).

Specimen visa (new records). TUNISIA: Douz, Kébili, 17.11.2021, *M. Kalboussi s.n.* (Herb. Univ. Monastir!).

Euphorbia milii var. ***splendens*** (Bojer ex Hook.) Ursch & Leandri in Mém. Inst. Sci. Madagascar, Sér. B, Biol. Vég. 5: 148. 1954.

≡ *E. splendens* Bojer ex Hook. in Botanical Magazine 56: pl. 2902. 1829.; ≡ *Lacanthis splendens* (Bojer ex Hook.) Raf. in Flora Telluriana 2: 94. 1836[1837]; ≡ *Sterigmanthe splendens* (Bojer ex Hook.) Klotzsch & Garcke in Abh. Königl. Akad. Wiss. Berlin 1859: 100. 1859[1860]; ≡ *Tithymalus splendens* (Bojer ex Hook.) M. Gómez in Fl. Habanera, Fanerog. 153. 1897.

(*Euphorbia* subg. *Euphorbia* L. sect. *Goniostema* Baill. ex Boiss.)

First report for the non-native flora of N Africa as casual.

Morphology (Fig. 2. F-G). An erect shrubby, succulent, spiny, **stem** terete, bark brown to grayish; younger **branches** about 8 mm in diam; **spines** in spirals or indistinct rows, not on spine shields, solitary or in groups of 3 or more, 16–25 mm long, grey to brown; leaves alternate or in indistinct rows, subsessile; blade ovate to ovate-elliptic 1.5–6 × 0.8–2 cm, base attenuate to rounded, margin entire, apex obtuse to acute or mucronate, venation hardly visible; **cyathia** several in exserted dichasia with long peduncles; **bracts** at branching 2 mm long, membranous, inconspicuous; **bracts** below cyathia in pairs, red or yellow or white or in various colours, showy and petaloid, 1–2 cm long; **cyathia** sessile in bracts, glands 4, without appendages; **capsules** and seeds not seen; **seeds** 3-4 mm long, brownish (Welzen & Chayamarit 2021).

Distribution. Originating to Central Madagascar, *Euphorbia milii* aggr is widely cultivated elsewhere. In Europe as in continental North Africa, no report till now for this taxon as casual, only in Morocco and Canary Islands where *Euphorbia milii* s. l. was cited as cultivated (Euro+Med 2006+; APD 2022).

Habitat in Tunisia. *Euphorbia milii* var. *splendens* occurs on coastal clayey slopes in the region Monastir where it seems escaping from pots or through the discharge of ornamental plant waste into the area (CE Tunisia).

Notes. *Euphorbia milii* var. *splendens* closely resembles to *E. milii* var. *milii*. It differs from *E. milii* s. str., however, by several morphological characters: it forms larger shrubs (up to ca. 2 m tall) with sprawling stems and spreading branches (up to ca. 1-2 cm thick), whereas *E. milii* var. *milii* is a semi-prostrate shrub (up to ca. 1.5-1.8 m tall) with climbing stems (up to ca.1 cm in diameter). Moreover, leaves are ovate (up to ca. 1.5–6 × 0.8–2 cm) with sometimes yellow cyathophylls in *Euphorbia milii* var. *splendens* rather than obovate (up to ca. 1–5(–6) × 1.5–2 cm) with brilliant red cyathophylls in *E. milii* var. *milii*.

Fig. 1. Casual shrubby species of *Euphorbia* from Tunisia: A-B) *Euphorbia cotinifolia* subsp. *cotinoides*; C-D) *E. cyathophora*; E) *E. pulcherrima*; F-G) *E. canariensis*. Photographs A-B & E-G by R. El Mokni, Photographs C-D by M. Kalboussi.

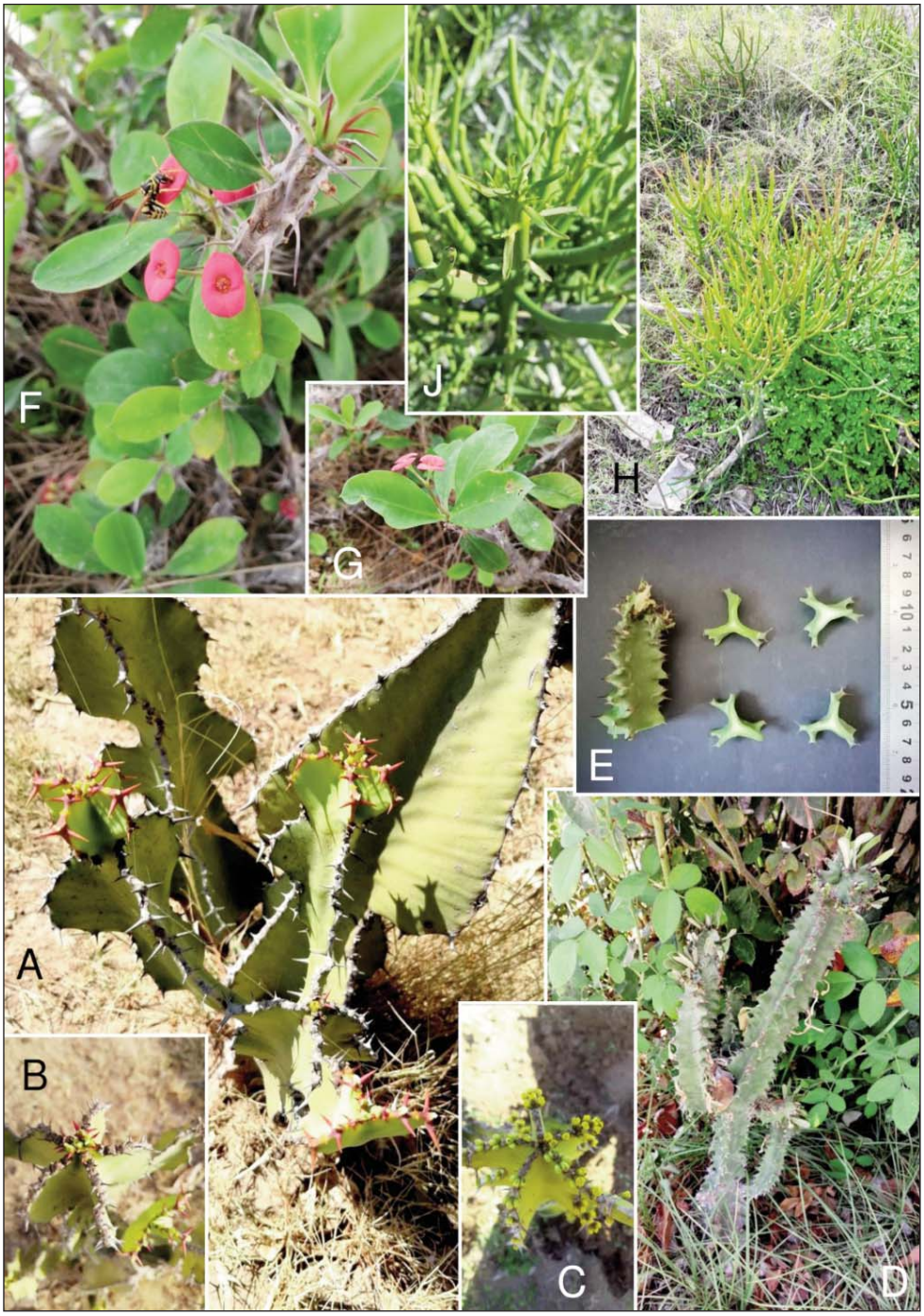

Fig. 2. Casual shrubby species of *Euphorbia* from Tunisia: A-C) *E. cooperi* var. *cooperi*; D-E) *E. trigona*; F-G) *E. milii* var. *splendens*; H & J) *E. tirucalli.* Photographs by R. El Mokni.

Specimen visa (new records). TUNISIA: Monastir, 26.07.2021, *R. El Mokni s.n.* (Herb. Univ. Monastir!).

E. pulcherrima Willdenow ex Klotzsch, Allg. Gartenzeitung 2: 27. 1834.
≡ *Poinsettia pulcherrima* (Willd. ex Klotzsch.) Graham in Edinburgh New Philos. J. 20: 412. 1836.
(*Euphorbia* subg. *Chamaesyce* Raf. sect. *Poinsettia* (Graham) Baill.)
First report for the non-native flora of the continental N Africa (and the Maghreb) as casual.
Morphology (Fig. 1. E). A shrubby tree (up to 3 m tall); **stem** up to 8 cm in diameter, not to slightly branched; **bark** light brown, smooth; **branchlets** hollow; **leaves** alternate, green; **stipules** as small scales, caducous; **petioles** about 5–7 cm long, subglabrous; **blades** ovate-elliptic and sometimes panduriformly lobed, about 12–17 × 6–9 cm, chartaceous, base acute or obtuse with very base acute, margin entire, apex acuminate, glabrous above, slightly brighter and distinctly pubescent below, venation distinct, not triplinerved, with almost 16–17 pairs of sideveins; **cyathia** grouped in an apical pseudo-umbel, glabrous, their bracts enlarged, leaflike, with a pedicel of 1–3 cm, narrower than stem-leaves, green with red midrib or completely red; **peduncles** 4–5 mm long; **involucres** about 5 × 4–5 mm; **gland** only 1 about 5 mm wide, without appendage; **ovary** with a pedicel of c. 3 mm; **stigmas** united into a style column of 1–5 mm, free stigmas completely bifid; **capsules** not seen, described as green, sulcate, with a somewhat fleshy pericarp; **seeds** not seen, described as 10 mm long, smooth (Welzen & Chayamarit 2021).
Distribution. Native to Mexican tropical forests from Sinaloa, W Mexico, to Guatemala (Steinmann, 2002), *Euphorbia pulcherrima* was vegetatively propagated as ornamental, known as a contemporary symbol of Christmas in many parts of the world (Ecke & al. 2004). The plant was reported as an alien in India and in the Canary Islands (Negi & Hajra 2007; APD 2022) and now widely cultivated in tropical and subtropical regions around the earth. In Europe as in continental North Africa, no report till now (Euro+Med 2006+; APD 2022).
Habitat in Tunisia. *Euphorbia pulcherrima* was found along roadside on waste area in the region of Monastir (CE Tunisia).
Notes. *Euphorbia pulcherrima* can be confused with *E. cyathophora* and *E. heterophylla* from which the plant differs mainly by its shrubby habit up to 3 m tall (*vs.* herbal habit up to 1.5 m tall for both *E. cyathophora* Murray and *E. heterophylla*), its cyathial bracts leaf-like, often deep red throughout (*vs.* uppermost leaves usually white in *E. heterophylla* or red in *E. cyathophora* at base only) and by its cyathia 4–5 mm in diameter (*vs.* cyathia less than 2 mm in diameter for both other species) (see e.g. Ma & Gilbert 2008; Silva & al. 2014).
Specimen visa (new records). TUNISIA: Monastir, 03.02.2021, *R. El Mokni s.n.* (Herb. Univ. Monastir!).

Euphorbia tirucalli L. in Sp. Pl. 1: 452. 1753.
≡ *Arthrothamnus tirucalli* (L.) Klotzsch & Garcke in Monatsber. Königl. Preuss. Akad. Wiss. Berlin 1859: 251. 1859; ≡ *Tirucalia tirucalli* (L.) P.V.Heath Calyx 5(3): 93. 1996.
(*Euphorbia* subg. *Euphorbia* L. sect. *Tirucalli* Boiss.)

Second report as an established alien for the non-native flora of Tunisia (with an extended area of occurrence) and the continental N Africa (El Mokni & al. 2019; APD 2022)

Morphology (Fig. 2. H & J). A shrubby, succulent and woody tree up to 3 m tall, without spines, monoecious or staminate only, usually leafless, with dichotomous or whorled branching; **branches** elongate, only 3–6 mm in diameter, slightly tomentose at apex; **stipules** very small (about 0.3 mm), glandular; **leaves** alternate, obovate-linear, 10–15 × 1–2 mm, very soon caducous; **cyathia** green, in subsessile, capitate glomerules, tomentose to glabrous, many-flowered glomerules often with staminate flowers only; **cyathial glands** 4, about 0.5 × 1–1.5 mm; **pistillate flowers** tomentose, with a distinct perianth; **capsules** exserted, about 7 mm long, glabrescent; **seeds** brown and often mottled, 4 × 3 mm, smooth, carunculate (Welzen & Chayamarit 2021).

Distribution. see El Mokni & al. (2019).

Habitat in Tunisia. The new record is assigned in the region of Mahdia (CE Tunisia), in the right edge of the railways from Mahdia to Bekalta with ruderal plants. Also, one more locality was recorded more recently from Kasserine to Gafsa (CW Tunisia), in the right side within plantations of *Opuntia ficus-indica* (L.) Mill.

Notes. *Euphorbia tirucalli* shows similarities with *E. aphylla* Brouss. ex Willd. in their habits, nevertheless the latter is caracterised by its very tiny leaves, scale-like ephemeral and quickly fall off thus the entire plant appears leafless (*vs.* leaves alternate, obovate-linear, 10–15 × 1–2 mm in *E. tirucalli*) (see e.g. Bramwell & Bramwell 2001; Ma & Gilbert 2008).

Specimen visa (new records). TUNISIA: Kasserine, 27.05.2022, *R. El Mokni s.n.* (Herb. Univ. Monastir!).

Euphorbia trigona Mill. in The Gardeners Dictionary: eighth edition no. 3. 1768.
= *E. hermentiana* Lem. L'Illustration Horticole 5(Misc.): 63. 1858.
(*Euphorbia* subg. *Euphorbia* L. sect. *Euphorbia* L.)

First report for the non-native flora of N Africa as casual.

Morphology (Fig. 2. D-E). Succulent shrubs or trees; **stems** and **branchlets** 4–6 cm in diameter, indistinctly constricted into oblong segments to 10-25 cm long with three wing-like angles and carry short, divergent paired **spines**, reddish-brown, later dark up to 6 mm long; **leaves** lanceolate to drop-shaped, varying from 7 to 9 mm and deciduous, to 3–5 cm and more persistent; **cyathia** solitary or in groups, bracts paired to 3.5 × 4 mm, ovate, obtuse, dentate, glands 5 to 2.2 mm; **bracteoles** approximately 2.5 mm, obovate, apex fringed; **stamens** numerous, filaments jointed, 2.6 mm; **female flowers** erect, ovary about 3.7 mm across, 3–celled, style 3, ovule 1; **capsule** to 7 mm, 3–lobed, 3.5 mm, obovoid (cf. India Biodiversity Portal 2016).

Distribution. *Euphorbia trigona*, native to Angola, Congo, Gabon and Malawi (Govaerts 2016) is widely commercialized as an ornamental, hedge plant and pot-plant across tropical subtropical and temperate regions. This species has the potential to escape from cultivation. In North America (Cuba and Belize) and India, where this species has become naturalized, it grows to form thickets in disturbed sites and abandoned gardens in dry and semiarid sites where it mostly spreads vegetatively by cuttings and stem fragments (see e.g. Balick & al. 2000; Oviedo & al. 2012; Govaerts 2016). In Europe, the taxon is reported only from Spain and in Canary Islands as present only in captivi-

ty/cultivation (Ortiz 2016). The taxon is not reported yet to continental North African (APD 2022).

Habitat in Tunisia. *Euphorbia trigona* occurs in the region of Monastir (CE Tunisia) within roadside in the shade of some cultivated *Rosa* sp.

Notes. *Euphorbia trigona* can be confused to *E. lactea* Haw. which is also triangular, with similar pattern on the branches. However, this latter differs mainly by having more spreading and less winged branches. In addition, *E. triangularis* Desf. ex A. Berger is repeatedly mistaken for the similar-sounding name *E. trigona*. However, it differs mainly by showing spreading, 3-5-edged branches.

Specimen visa (new records). TUNISIA: Monastir, 28.07.2021, *ibidem*, 25.10.2022, *R. El Mokni s.n.* (Herb. Univ. Monastir!).

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References

APD [African Plant Database] 2022: *Euphorbia* L. – in: *African Plant Database*. – http://www.ville-ge.ch/musinfo/bd/cjb/africa/details.php?langue=an&id=190670. [accessed 18/6/2022].

Arianoutsou, M., Bazos, I., Delipetrou, P. & Kokkoris, Y. 2010: The alien flora of Greece: Taxonomy, life traits and habitat preferences. – Biol. Inv. **12:** 3525-3549. https://doi.org/10.1007/s10530-010-9749-0

Balick, M. J., Nee, M. & Atha D. E. 2000: Checklist of the vascular plants of Belize. – New York.

Bramwell, D. & Bramwell, Z. 2001: Wild Flowers of the Canary Islands, 2nd ed. – Madrid.

Bruyns, P. V. 2006: Three new species of *Euphorbia* (*Euphorbiaceae*) and *Brachystelma* (*Apocynaceae*) from South Tropical Africa. – Novon **16:** 444-447.

—2012: Nomenclature and typification of southern African species of *Euphorbia*. – Bothalia **42:** 217-245.

—, Mapaya, R. J. & Hedderson, T. 2006: A new subgeneric classification for *Euphorbia* (*Euphorbiaceae*) in southern Africa based on ITS and psbA-trnH sequence data. – Taxon **55:** 397-420.

Capdevilla Argüelles, L., Iglesias Garcia, A., Orueta, J. F. & Zilleti, B. 2006 : Especies exoticas invasoras : Dignostico y bases para la prevencion y el manejo. Série Técnica. – Madrid.

DAISIE [Delivering Alien Invasive Species Inventories for Europe] 2009: Handbook of alien species in Europe. In Drake, J. A. (eds) Invading Nature - Springer Series in Invasion Ecology, **3.** – Dordrecht.

Darbyshire, I., Kordofani, M., Farag, I., Candiga, R. & Pickering, H. (eds) 2015: The Plants of Sudan and South Sudan. – Kew.

Domina, G. 2021: Invasive Aliens in Italy: Enumeration, History, Biology and Their Impact. – Pp. 190-214 in: Pullaiah, T. & Ielmini, M. R. (eds), Invasive Alien Species: Observations and Issues from Around the World, **3.** – Hoboken.

Ecke, I. P., Faust, J. E., Higgins, A. & Williams, J. 2004: The Ecke Poinsettia Manual. – Illinois.

Eggli, U. 2002: Illustrated Handbook of Succulent Plants: Dicotyledons, **2.** – Heidelberg.

El Mokni, R. & Verloove, F. 2021a: New records of cacti (*Opuntioideae*, *Cactaceae*) for the non-native flora of Tunisia and North Africa with a key to *Cylindropuntieae* tribe. – Medit. Bot. **42:** e69037. https://dx.doi.org/10.5209/mbot.69037

— & — 2021b: Additional species of *Agave* (*Agavoideae* /*Agavaceae*, *Asparagaceae* sensu lat.) introduced and naturalising in Tunisia and North Africa. – Bradleya **39:** 221-235.

— & — 2022: Further records of non-native succulents within Asparagaceae sensu lato as casual or naturalising aliens in Tunisia and North Africa. – Bradleya **40:** 119-129.

— 2022: *Ceropegia europaea* (Guss.) Bruyns, (*Apocynaceae*; *Asclepiadoideae*; *Ceropegieae*) in Tunisia: occurrence and conservation. – Bradleya special: 63-70.

—, Klak C. & van Jaarsveld E. 2022: First record of the Southern African endemic *Ruschia uncinata* (L.) Schwantes (*Aizoaceae*) outside its native area with notes on its distribution in North Africa (Tunisia). – Bradleya **40:** 113-118.

—, Elaissi, A. & Verloove, F. 2019: New succulents for the Tunisian and North African alien flora. – Haseltonia **26:** 68–77. https://doi.org/10.2985/026.026.0110

—, Verloove, F., Guiggi, A. & El Aouni, M. H. 2020: New records of cacti (*Opuntioideae* & *Cactoideae*, *Cactaceae*) from Tunisia. – Bradleya **38:** 35-50.

Encyclopedia of Succulents 2022: Genus *Euphorbia* L. (*Euphorbiaceae*). Available under a CC-BY-SA Creative Commons Attribution License. *cactuspedia.llifle.com*. < http://www.llifle.com/Encyclopedia/SUCCULENTS/Family/Euphorbiaceae/Euphorbia/> [Last accessed 18/6/2022]

Esser, H. J., Berry, P. E. & Riina, R. 2009: *Euphorbia*: a global inventory of the spurges. – Blumea **54:** 11-12. https://doi.org/10.3767/000651909X474023

Euro+Med 2006+: [continuously updated] Euro+Med PlantBase – the information resource for Euro-Mediterranean plant diversity. – http://www.europlusmed.org/cdm_dataportal/taxon/eb1eafdd-f548-48c3-b02d-930754192276 [accessed 18/6/2022]

Galasso, G., Conti, F., Peruzzi, L., Ardenghi, N. M. G., Banfi, E., Celesti-Grapow, L., Albano, A., Alessandrini, A., Bacchetta, G., Ballelli, S., Bandini Mazzanti, M., Barberis, G., Bernardo, L., Blasi, C., Bouvet, D., Bovio, M., Cecchi, L., Del Guacchio, E., Domina, G., Fascetti, S., Gallo, L., Gubellini, L., Guiggi, A., Iamonico, D., Iberite, M., Jiménez-Mejías, P., Lattanzi, E., Marchetti, D., Martinetto, E., Masin, R. R., Medagli, P., Passalacqua, N. G., Peccenini, S., Pennesi, R., Pierini, B., Podda, L., Poldini, L., Prosser, F., Raimondo, F. M., Roma-Marzio, F., Rosati, L., Santangelo, A., Scoppola, A., Scortegagna, S., Selvaggi, A., Selvi, F., Soldano, A., Stinca, A., Wagensommer, R. P., Wilhalm, T. & Bartolucci, F. 2018: An updated checklist of the vascular flora alien to Italy. – Pl. Biosyst. **152(3):** 556-592. https://doi:10.1080/11263504.2018.1441197

Govaerts, R. 2016: Family *Euphorbiaceae* - World Checklist of *Euphorbiaceae*. – London, http://apps.kew.org/wcsp/ [accessed 18/6/2022]

Hassemer, G., Da Silva, O. L. M., Funez, L. A., Ernst, M., Cordeiro, I. & Rønsted, N. 2017: Updates on the genus *Euphorbia* (Euphorbiaceae) in Santa Catarina, Brazil. – Phytotaxa **298(3):** 222-238. https://doi.org/10.11646/phytotaxa.298.3.2

Horn, J. W., Van Ee, B. W., Morawetz, J. J., Riina, R., Steinmann, V. W, Berry, P. E. & Wurdack, K. J. 2012: Phylogenetics and the evolution of major structural characters in the giant genus *Euphorbia* L. (*Euphorbiaceae*). – Molec. Phyl. Evol. **63:** 305-326. https://doi.org/10.1016/j.ympev.2011.12.022

Hyde, M. A., Wursten, B. T., Ballings, P. & Coates Palgrave, M. 2021: Flora of Zimbabwe: Species information: *Euphorbia cooperi* var. *cooperi*. – https://www.zimbabweflora.co.zw/speciesdata/species.php?species_id=135800 [accessed 31.07.2021]

India Biodiversity Portal 2016: Online Portal of India Biodiversity. – http://indiabiodiversity.org/species/list [accessed 18/6/2022]

Le Bourgeois, T., Carrara, A., Dodet, M., Dogley, W., Gaungoo, A., Grard, P., Ibrahim, Y., Jeuffrault, E., Lebreton, G., Poilecot, P., Prosperi, J., Randriamampianina, J. A., Andrianaivo A. P. & Théveny, F. 2008: Principales adventices des îles du sud-ouest de l'Océan Indien. Cirad. Montpellier, France, Cirad. – http://publish.plantnet-project.org/project/plantinvasivekruger/collection/collection/synthese/details/EPHCT [accessed 18.06.2022]

Ma, J. S. & Gilbert, M. G. 2008: The genus *Euphorbia* L. – Pp. 288-313 in: Wu, Z. Y., Raven, P. H. & D. Y. Hong, D. Y. (eds), Flora of China, **11.** –St. Louis, Beijing.

Meddour, R. & El Mokni, R. 2016 : État de l'art sur les plantes envahissantes ou à caractère invasif introduites en Algérie et en Tunisie. In Actes de la Conférence XV OPTIMA Meeting, 6-11 juin 2016, Montpellier, France.

—, Sahar, O. & Fried, G. 2020: A preliminary checklist of the alien flora of Algeria (North Africa): taxonomy, traits and invasiveness potential. – Bot. Letters **3:** 1-18. https://doi.org/10.1080/23818107.2020.1802775

Negi, P. S. & Hajra, P. K. 2007: Alien flora of Doon Valley, Northwest Himalaya. – Current Sci. **92(7):** 968-978.

Nobarinezhad, M. H., Pakravan, M. & Pahlevani, A. 2018: A biosystematic study of *Euphorbia* subgenus *Chamaesyce* (*Euphorbiaceae*) in Iran. – Phytotaxa **360(1):** 179-200. https://doi.org/10.11646/phytotaxa.360.3.1

Ortiz, D. G. 2016: Plantas ornamentales de la comarca del Camp de Morvedre. – Valencia.

Oviedo, R., Herrera, P., Caluff, M. G., Regalado, L., Ventosa, I., Plasencia, J. M., Baró, I., González, P. A., Pérez, J., Hechavarría, L., González-Oliva, L., Catasús, L., Padrón, J., Suárez S. I., Echevarría, R., Fuentes, I. M., Rosa, R., Oriol, P., Bonet, W., Villate, M., Sánchez, N., Begué, G., Villaverde, R., Chateloin, T., Matos, J., Gómez, R., Acevedo, C., Lóriga, J., Romero, M., Mesa, I., Vale, Á., Leiva, A. T., Hernández, J. A., Gómez, N. E., Toscano, B. L., González, M. T., Menéndez, A., Chávez, M. I. & Torres, M. 2012: Lista nacional de especies de plantas invasoras y potencialmente invasoras en la república de Cuba – 2011: 22-96. In: González-Torres, L. R., Rankin, R. & Palmarola, A. (eds). Plantas invasoras en Cuba. – Bissea **6(1):** 1-132.

POWO [Plants of the World Online] 2021: *Euphorbia canaraiensis* L. – http://www.plantsoftheworldonline.org/taxon/urn:lsid:ipni.org:names:345920-1 [accessed 31/7/2021]

— [Plants of the World Online] 2022a: *Euphorbia cotinifolia* subsp. *cotinoides* (Miq.) Christenh. – https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:20007878-1 [accessed 18/6/2022]

— [Plants of the World Online] 2022b: *Euphorbia heterophylla* var. *cyathophora* (Murray) Griseb. – https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:101634-2 [accessed 18/6/2022]

— [Plants of the World Online] 2022c: *Euphorbia cooperi* var. *cooperi*. – https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:77168328-1 http://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:347831-1 [accessed 18/6/2022]

Reveal, J. L. 2012: An outline of a classification scheme for extant flowering plants. Phytoneuron **37:** 1-221.

Riina, R., Berry, P. E. (coordinators) 2012+ [updated continuously]: Euphorbia planetary biodiversity inventory database. – http://app.tolkin.org/projects/72/taxa [Last accessed 18/6/2022]

Rizk, A. F. M. 1987: The chemical constituents and economic plants of *Euphorbiaceae*. – Bot. J. Linn. Soc. **94:** 293-326. https://doi.org/10.1111/j.1095-8339.1987.tb01052.x

Sakhraoui, N., Metallaoui, S., Chefrour, A. & Hadef, A. 2019: La flore exotique potentiellement envahissante d'Algérie : première description des espèces cultivées en pépinières et dans les jardins. – Biotech. Agron. Soc. Environ. **23(2):** 63-73. https://doi.org/10.25518/1780-4507.17902

Sanz Elorza, M., Dama, E. D. & Sobrino, E. 2004 : Atlas de las Plantas Alóctonas Invasoras en España. – Madrid.

Silva, O. L. M., Cordeiro, I. & Caruzo, M. B. R 2014: Synopsis of *Euphorbia* (*Euphorbiaceae*) in the state of São Paulo, Brazil. – Phytotaxa **181:**193-215.

Steinmann, V. W. 2002 : Diversidad y endemismo de la familia Euphorbiaceae en México. – Acta Bot. Mexicana **61:** 61-93.

Tropicos 2021: *Euphorbia* L. https://www.tropicos.org/name/Search [accessed 23.07.2021]

Vilà, M., Meggaro, Y. & Weber, E. 1999: Preliminary analysis of the naturalized flora of northern Africa. – Orsis **14:** 9-20.

Welzen, P. C. van & Chayamarit, K. 2022: Flora of Thailand, Euphorbiaceae. Naturalis Biodiversity Center, Leiden; Forest Herbarium, National Park, Wildlife and Plant Conservation Department, Bangkok. www.nationaalherbarium.nl/thaieuph. [accessed 18/6/2022]

Yang, Y., Riina, R., Morawetz, J. J., Haevermans, T., Aubriot, X., and Berry, P. E. 2012: Molecular phylogenetics and classification of *Euphorbia* subgenus *Chamaesyce* (*Euphorbiaceae*). – Taxon **61:** 764-789.

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